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ABSTRACT

"Why are we doing this math stuff, this is social studies class?" This statement reflects the common notion by students that academic disciplines are distinct and separate. While curriculum integration seems to be gaining acceptance again, most integration is done in the traditional manner: math/science or language arts/social studies. The purpose of this paper is to give examples of ways in which teachers can integrate the disciplines of mathematics and social studies in a meaningful way that will allow their students to construct their own knowledge based on their interaction with peers, teachers, and the Internet. Both the National Council of Teachers of Mathematics (NCTM) and National Council for the Social Studies (NCSS) standards support this type of integration. Three activities that integrate mathematics and the social studies disciplines of geography, political science and economics are discussed. Other activities relating mathematics to these and other social studies areas are also available on the Internet. Most of these activities also show integration of other academic disciplines. A list of World Wide Web sites for integrating mathematics and social studies and samples of resources and activities downloaded from the Internet are appended. (Author/ND)

Integrating Mathematics and Social Studies: Activities Based on Internet Resources

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A paper presented at the Montana Council Teachers of Mathematics Annual Meeting, Helena, October 18, 1996.

Integrating Mathematics and Social Studies:
Activities Based on Internet Resources

ABSTRACT

Have you ever head your middle school students say: "Why are we doing this math stuff, this is social studies class?" This statement reflects the common notion by students that academic disciplines are distinct and separate. While curriculum integration seems to be gaining acceptance again, most integration is done in the traditional manner; math/science or language arts/social studies.

The purpose of this paper is to give examples of ways in which teachers can integrate the disciplines of mathematics and social studies in a meaningful way which will allow their students to construct their own knowledge based on their interaction with peers, teachers, and the Internet. Both the NCTM and NCSS standards support this type of integration.

In this paper, we discuss three activities integrating mathematics to the social studies disciplines of geography, political science and economics. Other activities relating mathematics to these and other social studies disciplines are also available on the Internet. Most all of these activities also show integration of other academic disciplines.

Have you ever had your middle school students say: "Why are we doing this math stuff, this is social studies class or what does this geography junk have to do with math class?" We have both experienced this at both the k-12 and university levels and feel confident that if we were to ask some of you the same question, we would get an affirmative reply. While it is frustrating, we cannot blame the students. They are reflecting what American schools have been teaching for almost two centuries; that subject disciplines are separate entities and have no relationship to each other.

Since the 1970s there has been a trend, especially at the middle school level, to introduce interdisciplinary team-teaching. Most often, this is accomplished through team planning and turn-teaching where each team member teaches his/her specific discipline. If there is any true team-teaching, it usually consists of an integration of science/math or language arts/social studies. Other integration is rare although most of us know that life consists of the integration of all disciplines and more into thinking, problem solving etc.

The situation has been exacerbated in the last few years with the infusion of technology, especially computers, into the schools. Technology allows us to simulate the world as it really is, with all disciplines interacting together. And yet, we go about our merry way, adding a new subject area, called computers, to the curriculum.

John Lounsbury (1996) states that, while the middle school movement has made many advances, most of them have been organizational and not

curricular. He calls for middle schools to make the leap toward integrated learning.

What is integrated learning? According to Beane (1993), it is more than the simple connecting of two or more disciplines while maintaining their separate identities. It transcends and blurs subject area boundaries although it does not abandon knowledge and skills defined within the disciplines. "Integrated teaching is about unifying deeply meaningful experiences in learning for students, not about following a prescribed plan. It's teaching which 'draws out and brings forth' capacity for children to be lifelong learners" (Braunger and Hart-Landsberg, 1994, p.2). While curriculum integration became popular in the 1930s with the work of William Heard Killpatrick, it was dormant from the 1960s to the 1990s. It has come out of its dormant state, in part, because of the knowledge explosion. In the midst of this late twentieth century knowledge, it is getting increasingly difficult to think of an answer to the question of what knowledge and skills are more important than other knowledge and skills when the only thing we can be certain of is uncertainty (Beane, 1996).

While curriculum integration, especially project centered integration, makes perfect sense to us in terms of student learning and adjustment to life in the 21st century, we are also cognizant of the possible pitfalls. Before rushing off to implement the forms of curriculum integration we will be recommending in this paper, you should be aware of those possible pitfalls and defuse them prior to implementation.

Curriculum is a political subject, like it or not. Many parents will balk at a curriculum with blurred disciplinary lines, little drill and practice skill builders, or no very specific behavioral objectives. Parents and other citizens need to be involved in the planning process if it is to succeed.

Alleman and Brophy (1993), caution us that many activities described as ways to integrate the disciplines lacked any educational value in any of the disciplines or "invaded" one discipline at the expense of the other. They further state that forms of integration relate marginally to the disciplines and therefore integrate for the sake of integration. We recommend that you ask yourself the question: "Does this project or activity meet the goals we have established and will it help students not only learn the material, but to put it into their scheme of meaning and be able to utilize what they learned?" Other concerns raised by the same authors are related to the cost-effectiveness of the projects or activities and the fact that they might focus on doing rather than knowing and understanding. Does the value of the activity, in terms of goal accomplishment, merit the time it takes to accomplish that goal? Does the activity or project focus on student construction of knowledge as opposed to activity for the sake of activity?

Our purpose and/or goal for the rest of this paper is to give examples of ways in which teachers can integrate the disciplines of mathematics and social studies in a meaningful way for their students which will allow those students to construct their own knowledge based on their interaction with each other, teachers, and technology such as the Internet. We believe that this purpose is in harmony with both the NCTM and NCSS standards. Acknowledging the need to connect mathematics to other disciplines both inside and outside the classroom, connections is one of four standards that are emphasized at all

grade levels in the NCTM (1989) Standards. According to the NCSS Standards (1994), social studies promotes knowledge of and involvement in civic affairs and because civil issues are multidisciplinary in nature, understanding and resolving these issues require multidisciplinary education. While the area of integrated curriculum is still largely "uncharted waters" and it is difficult to suggest one superior approach, many teachers are recognizing the unity of knowledge with creative approaches based on activities, projects and inquiry led instruction (Braunger and Hart-Landsberg, 1994).

In this paper, we will discuss three activities integrating mathematics to the social studies disciplines of economics, political science (civics), and geography. There are many more activities and projects related to these disciplines as well as history, anthropology, and sociology, the other social science disciplines recognized as part of the K-12 social studies curriculum by NCSS (1994). Time and space constraints prohibit us from providing detailed descriptions of more activities. In light of this, we will be giving the readers WWW addresses which we think demonstrate the integration of mathematics and the social science disciplines. In addition, you will find that science and language arts are also integrated into most activities, giving further support to the concept that all disciplines are integrated in "the real world."

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WEB SITES FOR INTEGRATING MATHEMATICS AND SOCIAL STUDIES

http://www.grapevine.com/election/student4.htm
Student Voting

http://earthrise.sdsc.edu/earthrise/main.html
Earthrise

http://www.educ.wsu.edu/445archive/brown_s296/classroompoll.html
Classroom Poll

http://ericir.syr.edu/Projects/CHCP/
Chinese Historical and Cultural Project

http://www.mcrel.org/connect/plus/
Connections +

http://www.trinity.edu/departments/education/core/newplans.htm
Core Knowledge Lesson Plans and Units

http://ecedweb.unomaha.edu/teach.htm
EcEdWeb

http://www.csun.edu/%7Ehcedu013/index.html
Social Studies Lesson Plans and Resources

http://www.nosc.mil/planet_earth/states.html
Planet Earth Home Page

http://www.mapquest.com/
MapQuest Home Page

http://reonet.com/map.htm
Census Maps

http://www.tc.cornell.edu/Edu/MathSciGateway/educGateway.html
Cornell Theory Center Gateway for Educators

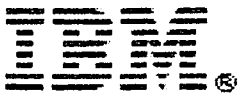
http://atm.geo.nsf.gov/skymath/lesson1.html
Skymath National Weather Report Module

http://forum.swarthmore.edu/
The Math Forum

http://www.ties.k12.mn.us/~jnorth/
Journey North

http://teaparty.terc.edu/ve/tercover.html
Overview of GIS Projects at TERC

http://seawifs.gsfc.nasa.gov/JASON/HTML/JASON.html
The JASON Project



It's a "Map" Thing: student activities

Activity #1: Global history

Is a globe a map? Visit "The Globes Room," which is part of "The Astronomical Museum" on the World Wide Web at **http://boas3.bo.astro.it/dip/Museum/english/Rooms_Globes.html**. Learn about the history of the globe as you locate answers to the following questions:

- When were the first globes believed to have been created?
- What purpose(s) did the globes serve?
- Describe the difference between a terrestrial and a celestial globe.

Activity #2: Beyond the horizon

To learn more about early globes, maps, and navigational devices used by early explorers, visit the "Expanding Horizons" Web page at **http://sunsite.unc.edu/expo/1492.exhibit/b-Mediterranean/exp.horiz.html#globe**. It is part of the "1492: An Ongoing Voyage" exhibit on the Web which provides rich information on the voyages of Christopher Columbus, his life and times. As you explore this site, locate the following information:

- What is a T-O map?
- Upon what was the Vopel globe based?
- What does the term "heliocentric" mean?
- What was Cosmography?
- When did the first map of America appear?

Activity #3: Mapmaker, Mapmaker, make me a map!

Have you ever thought about being a mapmaker? Visit the "Mapmaker, Mapmaker, Make me a Map" Web page at **http://loki.ur.utk.edu/ut2kids/maps/map.html** to learn about mapmakers. Locate information to answer the following questions:

- Describe the earliest known maps.
- Explain the difference between latitude and longitude.
- Define what the equator is.
- List and describe the different types of projections and how they are used by mapmakers.
- List and define standard types of maps.

Activity #4: Which way is north?

Using the World Wide Web page "Finding Your Way with Map and Compass" at **http://info.er.usgs.gov/fact-sheets/finding-your-way/finding-your-way.html**, locate information on maps to answer the following questions:

- Describe a topographic map. Include all the components of a topographic map in your description.
- How are map distances represented?
- How can you read direction on a map?
- Does a compass really point north? Explain your answer.
- What outside forces can affect a compass reading?

Activity #5: Finding the famous Tea Party

Learning to read a map is a very valuable and useful life skill. Plan a site seeing trip around the city of Boston by visiting "The Virtual Map" at **http://www.virtualmap.com/**. Also try visiting Boston at "The New BostonWeb ZoomMap" available from the "The Virtual Map" Web page.

- Outline a tour of Boston, including 5 historical sites. Determine the route of the tour, including distance and approximate travel time to and from each site.
- Will a subway ride be a part of your trip? Determine if any of the 5 historical sites on your tour can be reached via the subway. Where you will get on and off the subway?
- Mapmakers use north, south, east and west to describe direction and relationship of one place to another. Write a text description of each historical site on the tour in relation to direction and location

within the city of Boston.
- Using all the information you have compiled in the previous steps, create a travel brochure which includes an itinerary and a map of the tour you have designed.

Activity #6: Weather watcher

Weather maps are probably the most familiar type of map to most of us. Not only can we get a glimpse of several different weather maps on the daily news, we can also view current weather conditions on the World Wide Web. Visit 2 of the sites listed below and view a National weather map to gather the requested information:

- CNN's Weather - **http://www.cnn.com/WEATHER/**
- USA Today's Weather - **http://www.usatoday.com/weather/wfront.htm**
- The Weather Channel - **http://www.weather.com/**

- What is the current temperature in your city (or a city near you)?
- What does the five day forecast predict?
- Is there a low front over any part of the country? Explain your answer.

While looking for the above information,

- How many different types of maps did you view as you gathered the answers to the above questions?
- Of the maps that you viewed, how did they differ?
- Did one map (Web site) provided you with more information than the other? Support your answer with details.
- How often did you find the maps being updated?

Activity #7: What's your latitude?

To get latitude and longitude information on cities and towns in the United States, go to the "Tiger Map Server Browser" Web page at **http://tiger.census.gov/cgi-bin/mapbrowse-tbl/**. Scroll to the bottom of the screen and locate the search fields for a city or town. Key in the name of the city or town nearest you. You will be provided with summary information on the city along with the latitude and longitude of the city. Be sure to view the map of the city.

- What is the latitude and longitude of the city in which you live (or a city near you)?
- Pick another city, in another state, and record the latitude and longitude for that city.
- Mark and record this information on the map found in your team folder.
- Verify the latitude and longitude values for cities provided at this Web site with the latitude and longitude on the classroom globe.

Activity #8: Earth viewer

View various maps of the earth from the "Earth Viewer" Web page at **http://www.fourmilab.ch/earthview/vplanet.html.**

View a map of the earth. BE PATIENT! Below the map, key in your current latitude and longitude determined in Activity #7. Select the altitude for viewing the map. View the earth.

- What countries in the world are currently experiencing night time (at the time of viewing)?
- Using the same coordinates, view the earth from a different satellite and from the sun.
- View the map using the second set of coordinates you located in Activity #7. How do the maps compare?

Note: These maps tend to be very large and take time to load the image.

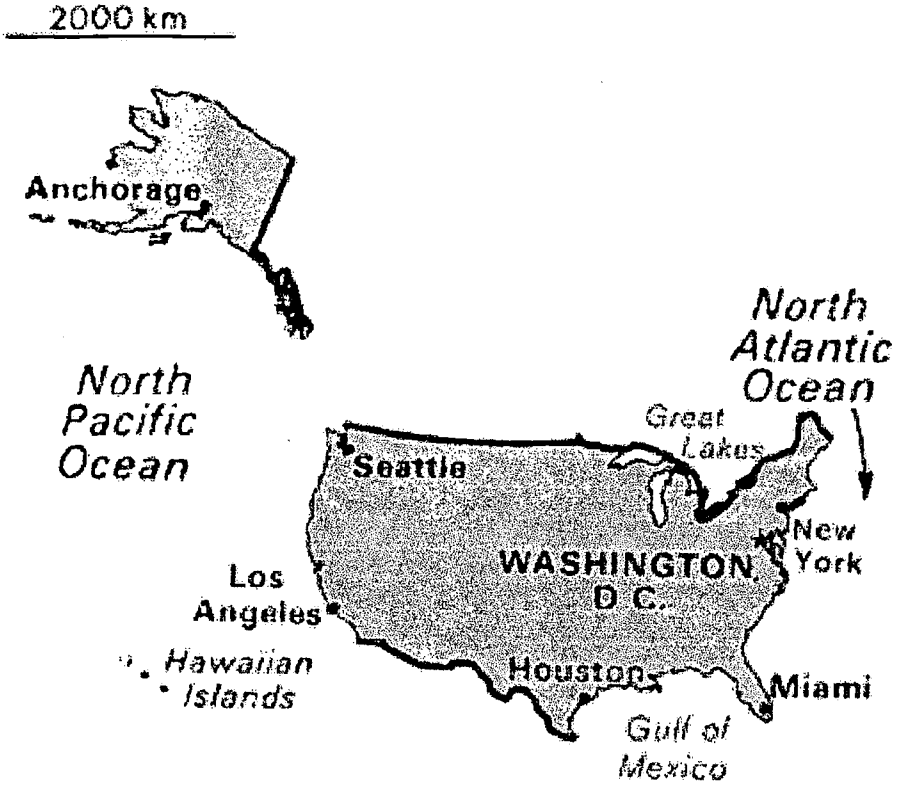
Activity #9: The Earth moved under my feet

Visit the "Southern California Earthquakes" map at **http://scec.gps.caltech.edu/earthquakes/current.gif** to view currently recorded earthquakes.

Print this map. Using latitude, longitude, and legend, label the map with more details such as major cities, landmarks, and heavy populated areas. Utilize the U.S. map in your team folder, revisit the "Tiger Map Server Browser" Web page at **http://tiger.census.gov/cgi-bin/mapbrowse-tbl/**, as well as any other classroom resources to help you accurately add more detail to the printed map.

Color code your map, indicating each earthquake magnitude with a different color.

Create an additional legend depicting your changes to the map. Determine the distance between the largest cities and the largest magnitude earthquakes.



United States

Geography

Location: North America, bordering both the North Atlantic Ocean and the North Pacific Ocean, between Canada and Mexico

Map references: North America

Area:
total area: 9,372,610 sq km
land area: 9,166,600 sq km
comparative area: about half the size of Russia; about three-tenths the size of Africa; about one-half the size of South America (or slightly larger than Brazil); slightly smaller than China; about two and one-half times the size of Western Europe
note: includes only the 50 states and District of Columbia

Land boundaries: total 12,248 km, Canada 8,893 km (including 2,477 km with Alaska), Cuba 29 km (US Naval Base at Guantanamo Bay), Mexico 3,326 km

Coastline: 19,924 km

Maritime claims:
contiguous zone: 12 nm
continental shelf: not specified
exclusive economic zone: 200 nm
territorial sea: 12 nm

International disputes: maritime boundary disputes with Canada (Dixon Entrance, Beaufort Sea, Strait of Juan de Fuca, Machias Seal Island); US Naval Base at Guantanamo Bay is leased from Cuba and only mutual agreement or US abandonment of the area can terminate the lease; Haiti claims Navassa Island; US has made no territorial claim in Antarctica (but has reserved the right to do so) and does not recognize the claims of any other nation; Republic of Marshall Islands claims Wake Island

Climate: mostly temperate, but tropical in Hawaii and Florida and arctic in Alaska, semiarid in the great plains west of the Mississippi River and arid in the Great Basin of the southwest; low winter temperatures in the northwest are ameliorated occasionally in January and February by warm chinook winds from the eastern slopes of the Rocky Mountains

Terrain: vast central plain, mountains in west, hills and low mountains in east; rugged mountains and broad river valleys in Alaska; rugged, volcanic topography in Hawaii

Natural resources: coal, copper, lead, molybdenum, phosphates, uranium, bauxite, gold, iron, mercury, nickel, potash, silver, tungsten, zinc, petroleum, natural gas, timber

Land use:
arable land: 20%
permanent crops: 0%
meadows and pastures: 26%
forest and woodland: 29%
other: 25%

Irrigated land: 181,020 sq km (1989 est.)

Environment:
current issues: air pollution resulting in acid rain in both the US and Canada; the US is the largest single emitter of carbon dioxide from the burning of fossil fuels; water pollution from runoff of pesticides and fertilizers; very limited natural fresh water resources in much of the western part of the country require careful management; desertification
natural hazards: tsunamis, volcanoes, and earthquake activity around Pacific Basin; hurricanes along the Atlantic coast; tornadoes in the midwest; mudslides in California; forest fires in the west; flooding; permafrost in northern Alaska is a major impediment to development
international agreements: party to - Air Pollution, Air Pollution-Nitrogen Oxides, Antarctic Treaty, Climate Change, Endangered Species, Environmental Modification, Marine Dumping, Marine Life Conservation, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Wetlands, Whaling; signed, but not ratified - Air Pollution-Volatile Organic Compounds, Antarctic-Environmental Protocol, Biodiversity, Desertification, Hazardous Wastes, Tropical Timber 94

Note: world's fourth-largest country (after Russia, Canada, and China)

People

Population: 263,814,032 (July 1995 est.)

Age structure:
0-14 years: 22% (female 28,391,451; male 29,845,630)
15-64 years: 65% (female 86,454,415; male 85,474,002)
65 years and over: 13% (female 19,949,978; male 13,698,559) (July 1995 est.)

Population growth rate: 1.02% (1995 est.)

Birth rate: 15.25 births/1,000 population (1995 est.)

Death rate: 8.38 deaths/1,000 population (1995 est.)

Net migration rate: 3.34 migrant(s)/1,000 population (1995 est.)

Infant mortality rate: 7.88 deaths/1,000 live births (1995 est.)

Life expectancy at birth:
total population: 75.99 years
male: 72.8 years
female: 79.7 years (1995 est.)

Total fertility rate: 2.08 children born/woman (1995 est.)

Nationality:
noun: American(s)
adjective: American

Ethnic divisions: white 83.4%, black 12.4%, Asian 3.3%, Native American 0.8% (1992)

Religions: Protestant 56%, Roman Catholic 28%, Jewish 2%, other 4%, none 10% (1989)

Languages: English, Spanish (spoken by a sizable minority)

Literacy: age 15 and over has completed five or more years of schooling (1979)
total population: 97%
male: 97%
female: 97%

Labor force: 131.056 million (includes unemployed) (1994)
by occupation: managerial and professional 27.5%, technical, sales and administrative support 30.3%, services 13.7%, manufacturing, mining, transportation, and crafts 25.5%, farming, forestry, and fishing 2.9%

Government

Names:
conventional long form: United States of America
conventional short form: United States

Abbreviation: US or USA

Digraph: US

Type: federal republic; strong democratic tradition

Capital: Washington, DC

Administrative divisions: 50 states and 1 district*; Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia*, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming

Dependent areas: American Samoa, Baker Island, Guam, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Islands, Navassa Island, Northern Mariana Islands, Palmyra Atoll, Puerto Rico, Virgin Islands, Wake Island
note: from 18 July 1947 until 1 October 1994, the US has administered the Trust Territory of the Pacific Islands, but recently entered into a new political relationship with all four political units: the Northern Mariana Islands is a Commonwealth in political union with the US (effective 3 November 1986); Palau concluded a Compact of Free Association with the US (effective 1 October 1994); the Federated States of Micronesia signed a Compact of Free Association with the US (effective 3 November 1986); the Republic of the Marshall Islands signed a Compact of Free Association with the US (effective 21 October 1986)

Independence: 4 July 1776 (from England)

National holiday: Independence Day, 4 July (1776)

Constitution: 17 September 1787, effective 4 March 1789

Legal system: based on English common law; judicial review of legislative acts; accepts compulsory ICJ jurisdiction, with reservations

Suffrage: 18 years of age; universal

Executive branch:
chief of state and head of government: President William Jefferson CLINTON (since 20 January 1993); Vice President Albert GORE, Jr. (since 20 January 1993); election last held 3 November 1992 (next to be held 5 November 1996); results - William Jefferson CLINTON (Democratic Party) 43.2%, George BUSH (Republican Party) 37.7%, Ross PEROT (Independent) 19.0%, other 0.1%
cabinet: Cabinet; appointed by the president with Senate approval

Legislative branch: bicameral Congress
Senate: elections last held 8 November 1994 (next to be held 5 November 1996); results - percent of vote by party NA; seats - (100 total) Republican Party 54, Democratic Party 46
House of Representatives: elections last held 8 November 1994 (next to be held 5 November 1996); results - percent of vote by party NA; seats - (435 total) Republican Party 231, Democratic Party 203, independent 1

Judicial branch: Supreme Court

Political parties and leaders: Republican Party, Haley BARBOUR, national committee chairman; Jeanie AUSTIN, co-chairman; Democratic Party, David C. WILHELM, national committee chairman; several other groups or parties of minor political significance

Member of: AfDB, AG (observer), ANZUS, APEC, AsDB, Australia Group, BIS, CCC, CP, EBRD, ECE, ECLAC, ESCAP, FAO, G- 2, G- 5, G- 7, G- 8, G-10, GATT, IADB, IAEA, IBRD, ICAO, ICC, ICFTU, ICRM, IDA, IEA, IFAD, IFC, IFRCS, ILO, IMF, IMO, INMARSAT, INTELSAT, INTERPOL, IOC, IOM, ISO, ITU, MINURSO, MTCR, NACC, NATO, NEA, NSG, OAS, OECD, OSCE, PCA, SPC, UN, UN Security Council, UNCTAD, UNHCR, UNIDO, UNIKOM, UNITAR, UNMIH, UNOMOZ, UNPROFOR, UNRWA, UNTSO, UNU, UPU, WCL, WHO, WIPO, WMO, WTO, ZC

Flag: thirteen equal horizontal stripes of red (top and bottom) alternating with white; there is a blue rectangle in the upper hoist-side corner bearing 50 small white five-pointed stars arranged in nine offset horizontal rows of six stars (top and bottom) alternating with rows of five stars; the 50 stars represent the 50 states, the 13 stripes represent the 13 original colonies; known as Old Glory; the design and colors have been the basis for a number of other flags including Chile, Liberia, Malaysia, and Puerto Rico

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Economy

Overview: The US has the most powerful, diverse, and technologically advanced economy in the world, with a per capita GDP of $25,850, the largest among major industrial nations. The economy is market oriented with most decisions made by private individuals and business firms and with government purchases of goods and services made predominantly in the marketplace. In 1989 the economy enjoyed its seventh successive year of substantial growth, the longest in peacetime history. The expansion featured moderation in wage and consumer price increases and a steady reduction in unemployment to 5.2% of the labor force. In 1990, however, growth slowed to 1% because of a combination of factors, such as the worldwide increase in interest rates, Iraq's invasion of Kuwait in August, the subsequent spurt in oil prices, and a general decline in business and consumer confidence. In 1991 output fell by 0.6%, unemployment grew, and signs of recovery proved premature. Growth picked up to 2.3% in 1992 and to 3.1% in 1993. Unemployment, however, declined only gradually, the increase in GDP being mainly attributable to gains in output per worker. The year 1994 witnessed a solid 4% gain in real output, a low inflation rate of 2.6%, and a drop in unemployment below 6%. The capture of both houses of Congress by the Republicans in the elections of 8 November 1994 means substantial changes are likely in US economic policy, including changes in the ways the US will address its major economic problems in 1995-96. These problems include inadequate investment in economic infrastructure, rapidly rising medical costs of an aging population, and sizable budget and trade deficits.

National product: GDP - purchasing power parity - $6.7384 trillion (1994)

National product real growth rate: 4.1% (1994)

National product per capita: $25,850 (1994)

Inflation rate (consumer prices): 2.6% (1994)

Unemployment rate: 5.5% (March 1995)

Budget:
revenues: $1.258 trillion
expenditures: $1.461 trillion, including capital expenditures of $NA (1994)

Exports: $513 billion (f.o.b., 1994)
commodities: capital goods, automobiles, industrial supplies and raw materials, consumer goods, agricultural products
partners: Western Europe 24.3%, Canada 22.1%, Japan 10.5% (1993)

Imports: $664 billion (c.i.f., 1994)
commodities: crude oil and refined petroleum products, machinery, automobiles, consumer goods, industrial raw materials, food and beverages
partners: Canada, 19.3%, Western Europe 18.1%, Japan 18.1% (1993)

External debt: $NA

Industrial production: growth rate 5.4% (1994 est.)

Electricity:
capacity: 695,120,000 kW
production: 3.1 trillion kWh
consumption per capita: 11,236 kWh (1993)

Industries: leading industrial power in the world, highly diversified and technologically advanced; petroleum, steel, motor vehicles, aerospace, telecommunications, chemicals, electronics, food processing, consumer goods, lumber, mining

Agriculture: accounts for 2% of GDP and 2.9% of labor force; favorable climate and soils support a wide variety of crops and livestock production; world's second largest producer and number one exporter of grain; surplus food producer; fish catch of 4.4 million metric tons (1990)

Illicit drugs: illicit producer of cannabis for domestic consumption with 1987 production estimated at 3,500 metric tons or about 25% of the available marijuana; ongoing eradication program aimed at small plots and greenhouses has not reduced production

Economic aid:
donor: commitments, including ODA and OOF, (FY80-89), $115.7 billion

Currency: 1 United States dollar (US$) = 100 cents

Exchange rates:
British pounds: (#) per US$ - 0.6350 (January 1995), 0.6529 (1994), 0.6033 (1993), 0.5664 (1992), 0.5652 (1991), 0.5603 (1990)
Canadian dollars: (Can$) per US$ - 1.4129 (January 1995), 1.3656 (1994), 1.2901 (1993), 1.2087 (1992), 1.1457 (1991), 1.1668 (1990)
French francs: (F) per US$ - 5.2943 (January 1995), 5.5520 (1994), 5.6632 (1993), 5.2938 (1992), 5.6421 (1991), 5.4453 (1990)
Italian lire: (Lit) per US$ - 1,609.5 (January 1995), 1,612.4 (1994), 1,573.7 (1993), 1,232.4 (1992), 1,240.6 (1991), 1,198.1 (1990)
Japanese yen: (Y) per US$ - 99.75 (January 1995), 102.21 (1994), 111.20 (1993), 126.65 (1992), 134.71 (1991), 144.79 (1990)
German deutsche marks: (DM) per US$ - 1.5313 (January 1995), 1.6228 (1994), 1.6533 (1993), 1.5617 (1992), 1.6595 (1991), 1.6157 (1990)

Fiscal year: 1 October - 30 September

Transportation

Railroads:
total: 240,000 km mainline routes (nongovernment owned)
standard gauge: 240,000 km 1.435-m gauge (1989)

Highways:
total: 6,243,163 km
paved: 3,633,520 km (including 84,865 km of expressways)
unpaved: 2,609,643 km (1990)

Inland waterways: 41,009 km of navigable inland channels, exclusive of the Great Lakes (est.)

Pipelines: petroleum 276,000 km; natural gas 331,000 km (1991)

Ports: Anchorage, Baltimore, Boston, Charleston, Chicago, Duluth, Hampton Roads, Honolulu, Houston, Jacksonville, Los Angeles, New Orleans, New York, Philadelphia, Port Canaveral, Portland (Oregon), Prudhoe Bay, San Francisco, Savannah, Seattle, Tampa, Toledo

Merchant marine:
total: 354 ships (1,000 GRT or over) totaling 11,462,000 GRT/16,477,000 DWT
ships by type: bulk 22, cargo 28, chemical tanker 16, intermodal 130, liquefied gas tanker 13, passenger-cargo 2, tanker 130, tanker tug-barge 13
note: in addition, there are 189 government-owned vessels

Airports:
total: 15,032
with paved runways over 3,047 m: 181
with paved runways 2,438 to 3,047 m: 208
with paved runways 1,524 to 2,437 m: 1,242
with paved runways 914 to 1,523 m: 2,489
with paved runways under 914 m: 8,994
with unpaved runways over 3,047 m: 1
with unpaved runways 2,438 to 3,047 m: 7
with unpaved runways 1,524 to 2,438 m: 180
with unpaved runways 914 to 1,523 m: 1,730

Communications

Telephone system: 126,000,000 telephones; 7,557,000 cellular telephones
local: NA
intercity: large system of fiber-optic cable, microwave radio relay, coaxial cable, and domestic satellites
international: 16 satellites and 24 ocean cable systems in use; 61 INTELSAT (45 Atlantic Ocean and 16 Pacific Ocean) earth stations (1990)

Radio:
broadcast stations: AM 4,987, FM 4,932, shortwave 0
radios: 530 million

Television:
broadcast stations: 1,092 (about 9,000 cable TV systems)
televisions: 193 million

Defense Forces

Branches: Department of the Army, Department of the Navy (includes Marine Corps), Department of the Air Force

Defense expenditures: $284.4 billion, 4.2% of GDP (1994 est.)

'96 Who Elects the President?

PROJECT OVERVIEW
- Summary
- Activities
- Materials
- Student Election '96 Results
- Schedule and Updates
- Participants
- To Register
- Project Recognition

DETAILS
- Balloting Procedures
- Polling site
- Class Discussions
- Candidates and issues evaluation
- WWW political resources
- Posters and cartoons
- Students OnPolitics OnLine
- Data Analysis

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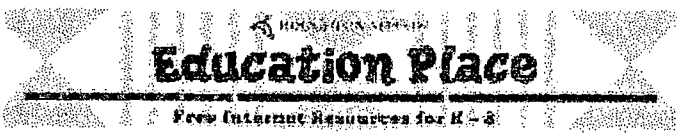

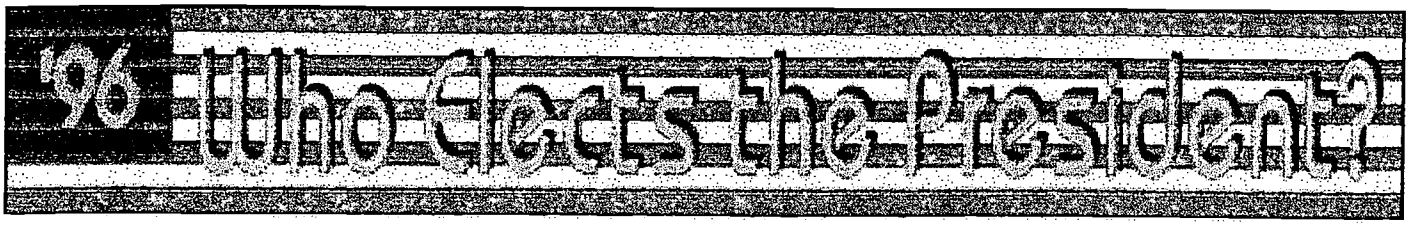

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Balloting Data Analysis

Analysis Preparation

Class Discussion/Preparation:

- Ask students ahead of time to suggest what kind of information they want to learn the voting data. Make a list of questions.
- How the voting data should be grouped (e.g., gender, grade, region), how table rows and columns should be labelled, how results should be shown (numbers, percents).
- Which kinds of graphs will best reflect the analysis questions.
- Ask them to predict the most important factors in candidate outcomes and to support their prediction with facts/information.

Spreadsheets: : Students can begin making spreadsheets before the results are returned Nov. 5. See suggested categories for rows and columns in succeeding sections. Practice can include formulas for totalling columns and rows, for adding specific cells, and for calculating percentages. Students may create sample data to practice making charts/graphs.

Numbers and Percentages: All totals should be given as percentages for numerical comparison and bar graph comparison. Pie graphs will give the same visual comparison of numerical results without having to calculate each grouping as a percentage of total students voting.

Selecting Analysis Factors: Data may be analyzed for a variety of factors and levels, depending upon classroom needs. Suggestions are given for several different comparisons, any or all of which may be used for inquiry.

Analyzing General Student Balloting

(Optional Voting Data)

Making Spreadsheets:

1. Make a table or spreadsheet to show vote results for each candidate by region, by grade by gender. Gender as a subgroup of grade, grade as a subgroup of region (East, Heartland, West).
2. Which factors should go in the rows? In the columns? Why?
3. Make a column for the overall totals for each candidate.
4. Total the data across grades to show totals for gender. Show the data as a percentage of the total number of youths voting. Why?
5. Total the data across gender to show individual grade level totals. Show the data as a percentage of the total vote.
6. Group the grade level totals as 5-8 and 9-12. Show the data as a percentage of the total vote.
7. Total the data across grades and gender to show regional totals. Show the data as a percentage of the total vote.

Making Graphs:

Make a pie chart and a bar graph (why is a line graph not appropriate) for: gender totals; grade totals; grouped grade totals; regional.

Reading Results:

Using spreadsheet and graphs, answer these questions:

- Who is the top choice overall? By grade level? By grade group? By gender? By region?
- Who is the bottom choice? by grade level? By grade group? By gender? By region?
- Which factors (region, grade, gender) show the greatest differences in candidate choices?
- What other major differences do you see in any of the groupings?
- Which type of graph shows which factors better? Why?

Interpreting Results:

- Which analyzed factors (region, grade, gender) most influenced the balloting results?
- What uncontrolled polling factors may have influenced the balloting results?
- Based on your results, draw conclusions about political and issue concerns of the voting groups.

Comparing Optional and Mandatory Voting

Use the same basic guidelines as for General Balloting analysis.

Making Spreadsheets: Set up a table or spreadsheet to report results for each candidate in the optional and mandatory balloting by grade grouping by gender.
Will you make a separate spreadsheet for optional and for mandatory? Or one spreadsheet? Why?

Making Graphs: Make a pie chart, a bar graph.

Reading Results: What differences are shown in Mandatory and Optional choices: overall? By gender? By grade grouping?

Interpreting Results: Suggest factors influence in optional and mandatory outcomes?

Comparing Adult and Youth Voting

Use the same basic guidelines as for General Balloting analysis.

Making Spreadsheets: Make a spreadsheet to report results percentages for each candidate for adults and youths. Youth results can be separated by grade level groupings.

Making Graphs: Make a pie chart, a bar graph.

Reading Results: What are the differences between overall youth and adult election outcome? Comparing grade groups with adults? Comparing percentage of youth and of adults choosing to vote? (See US Census Bureau data indicating 45% of adults voted in 1994 election.)

Interpreting Results: Suggest factors that influence: adult vs. youth outcomes; percentages choosing to vote. (e.g. first time voters, poll accesibility)

Comments and suggestions are appreciated: schubert@minn.net

Activities | Balloting | Materials | Main | Participants | Register | Resources | Results | Students OnLine | Updates

City of Cambridge, Massachusetts

Voting Demonstration

Each voter enters 1 for 1st choice, 2 for second choice, etc. It is not necessary to give a vote for each candidate, but only numbers can be given, and repeat numbers invalidate a voter's ballot.

4 Candidates for 2 Offices:

Voter:	1	2	3	4	5
Candidate A	☐	☐	☐	☐	☐
Candidate B	☐	☐	☐	☐	☐
Candidate C	☐	☐	☐	☐	☐
Candidate D	☐	☐	☐	☐	☐

Submit Query

Return to proportional voting information

webmaster@ci.cambridge.ma.us

How The Ballots Are Counted

The count begins with the sorting of ballots by the first preference shown--the NUMBER 1 vote. This is generally known as the "First Count".

Any candidates who reach the necessary quota with Number 1 votes are declared elected. Any extra ballots they receive beyond the quota, referred to as the "surplus," are redistributed to the candidates marked next in preference on those surplus ballots according to the "Cincinatti Method."

After the surplus is redistributed, the count continues with the elimination of those candidates who received fewer than fifty votes in the first count. Their ballots are redistributed to the remaining unelected candidates according to the next preference marked.

After each distribution, the candidate now having the lowest number of votes is eliminated and his/her ballots are redistributed to the next indicated preference among the remaining unelected candidates.

As candidates "reach quota" through the addition of redistributed ballots to their totals, they are declared elected and no further ballots are transferred to them.

This process continues until all candidates have been eliminated except the nine winners.

Return to the index page

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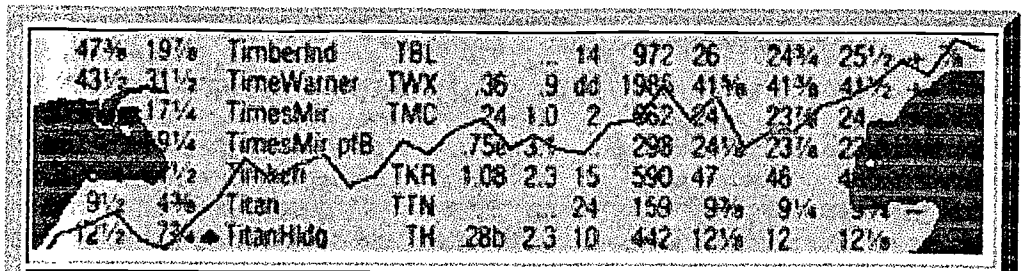


A Web-based Interactive Stock Market Learning Project for K-12

GNB's New Interface - The Urbana Way

- Overview
- Purpose and Objectives
- Teacher Resources
- Student Resources
- Web Resources

An Overview

Welcome to the the ***Good News Bears Stock Market Project*** - an interdisciplinary project specifically designed for middle school students and teachers.

This project revolves around an interactive stock market competition between classmates using real-time stock market data from the New York Stock Exchange and NASDAQ.

Lessons from a variety of subject areas have been added for teacher convenience. These lessons and warm-up discussion topics are designed to give the student a better understanding of how the stock market is an integral part of their everyday life and future security.

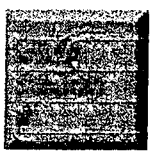
Objectives and Purpose

- **Students will be able to recognize and use terms related to market activities.**
- **Students will be able to use research tools on the Web to make an informed decision in developing their stock portfolio.**
- **Students will be able to track and manage their own portfolio of stocks.**
- **Students will be able to recognize the effect that economic indicators, company management, political climate, foreign relations, and other variables have on the stock market.**
- **Students will be able to analyze their own stock data in relation to the fluctuating indicators.**

We would like to thank the Education Outreach Group at the National Center for Supercomputing Applications (NCSA) for their continued support and encouragement during our summer program in July of 1995.

Thank you for visiting our project. This is an ongoing effort and its success depends upon you! Please send us your comments and suggestions.

Comments or Suggestions



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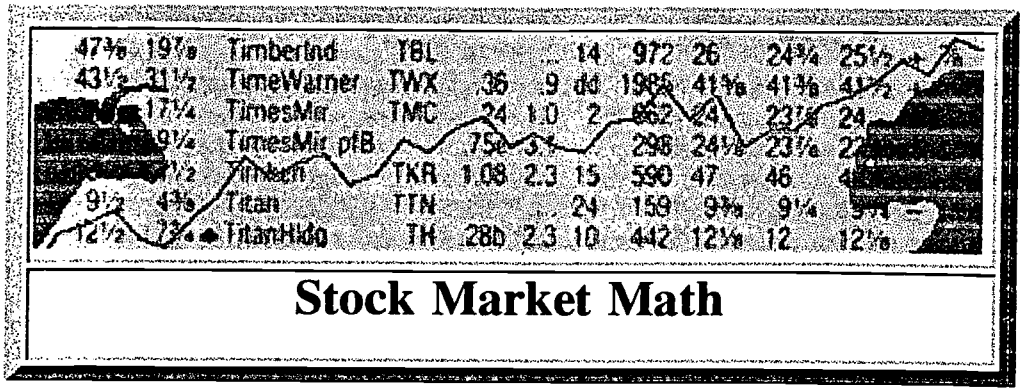


The following lesson includes various concepts which are used when trading on the stock market. This lesson should be thought of as a mini-unit in the sense that it will take more than one day to complete. These concepts are so inter-related when working in the context of the stock market that they should be used in conjunction with one another rather than being taught separately.

Objectives:

1. Students will be able to calculate commission for a stock transaction through a broker using the relationship between percentages and decimals.
2. Students will be able to decide which stocks are preferable based on the price to earnings ratios listed on the stock market quotes.
3. Students will be able to use fractions and decimals to calculate the cost to buy or sell various stocks using the stock market quotes high and low listings.
4. Students will be able to use the stock market quote change column and their knowledge of the positive and negative sign to decide which stocks are looking promising.

Materials:
1. Either copies of one page of the NY. Stock Exchange from the Wall Street Journal per student or a copy of the NYSE worksheet per student.

2. Pencil.

3. Paper.

4. Overhead or Chalkboard

Connection to the Curriculum: This lesson will tie in the following math concepts which are studied during the middle school years: percentages, decimals, fractions, ratios, probability, positive and negative numbers, problem solving using some pre algebra concepts.

Procedure: 1. Ask the students what they know about the stock market. What is it? Why do people invest their money in it? How does it relate to or effect the nations economy? Does anyone know any history of the stock market?

2. After instigating some discussion about the market, handout the NYSE sheet or a page from the Wall Street Journal to each student.

3. As a class look at the various columns and ask for any input about what is listed in the various columns. Let the students explain all they know about the different aspects of the stock market before analyzing the columns.

There is a definition for each column listed on our definition page.

4. Choose a stock from the NYSE page and as a class go through how one would figure out what the various columns mean for 100 shares of the stock chosen by the class. (Let the students use the new information as to what the columns stand for to figure out as much as possible about the chosen stock, on their own.) Below is an example:

Say I chose the stock Tribune which has the following vital signs:
Sym: TRB
Div: 1.12
%: 1.8
PE: 16
Vol. 100s: 217
Hi: 61 1/8
Lo: 60 5/8
Close: 60 3/4
Net Chg: -5/8

I want to buy 100 shares of TRB at the Lo. So I then multiply the low price of 60 5/8 by 100. This will give the cost. I want to sell 100 shares of TRB at the Hi. So I multiply the high price of 61 1/8 by 100. If I want to research TRB before I decide to invest in it, then I would use the PE number and the Net Chg which both tell me a little about the background of the stock. If I already own 100 shares of TRB and the company is now paying out dividends, then I can figure out how much I should get by multiplying 100 by the Div. number or multiplying 100 by the % number changed into a decimal.

(I encourage you to use this as a reference for you as the teacher, not as a teaching example. The students should examine the meanings of the columns, then using that knowledge should calculate the different amounts.)

5. Now let the students work with others to analyze the stocks listed on this page and to go through the questions.

Evaluation:
The students should research various stocks and choose 5 of the stocks in which to invest. Before the students create their portfolio journal, they need to have sufficient research information to be able to show why they are investing in the stocks they choose to invest in. Then they should create a portfolio journal in order to enter their stock data. We have included a format in which the students can use to chart the data. Then students should use the data to create graphs and compare the stocks to each other or to other people's stock or to the S&P 500. By doing this, the students may be able to estimate more accurately when it is profitable to sell and buy. At the end of the unit, students should be able to show the class how the stocks they invested in performed, why they sold any stocks they may have sold, what they would have done differently in the future and what they now know about the stock market that they didn't know at the beginning of the unit.

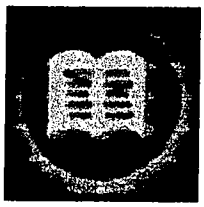
Please send any feedback about how you used this lesson, things that worked, things that you would recommend be changed, things that you would add, or any additional lessons for this topic to the *Good News Bears*.


Go Back to Math Lesson Page

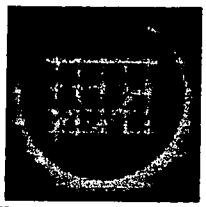
[Home]

[Getting Connected]

[Student Resources]



[Teacher Resources]



[UISES Trading Floor]

The Good News Bears

The Internet Stockmarket Game

GNB 1996-97 is Now Open!

The Good News Bears is a program specifically designed for students in grades 5-12 to learn about saving and investing by using real-time web resources and activities provided on this site. Thanks to the College of Commerce at the University of Illinois, as many as 200 students will be involved in a beta test of UISES, the University's investment simulation on the web.

GNB also contains a number of elective activities that students or classes may participate, including designing student portfolios on the web, taking part in developing an interactive glossary, and many other activities for students to learn about saving and investing. Teacher and student resources are available for several content areas; more will be added as they become available.

We still have accounts availabe in the UISES online competition. If you are interested in getting your class involved, mail Jim Peterson.

If you are not involved in the online competition, feel free to participate in any of the activities on this site, use the resources provided, or reproduce any of these materials for use in the classroom.

Last Modified: October 8, 1996
Comments: Jim Peterson (petersjd@cmi.k12.il.us)

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